CLAIMS

1. A gap-soliton structure comprising:

a cladding structure having alternating layers of different index values; and

a core region that is interposed between said alternating layers of index values, wherein

said core or said cladding structure includes one or more nonlinear materials so as to achieve gap-soliton bistability.

2. The gap-soliton structure of claim 1, wherein said cladding structure and core region form a photonic crystal fiber.

3. The gap-soliton structure of claim 2, wherein said photonic crystal fiber comprises a Holey fiber.

4. The gap-soliton structure of claim 2, wherein said photonic crystal fiber comprises an Omniguide fiber.

5. The gap-soliton structure of claim 1, wherein said core comprises said one or more nonlinear materials in a defined region.

6. The gap-soliton structure of claim 1, wherein said cladding structure comprises said one or more materials.

7. A method of forming a gap-soliton structure comprising:

forming a cladding structure having alternating layers of different index values;

forming a core region that is interposed between said alternating layers of index values; and

providing in said core or said cladding structure one or more nonlinear materials so as to achieve gap-soliton bistability.

8. The method of claim 7, wherein said said cladding structure and core region form a photonic crystal fiber.

9. The method of claim 8, wherein said photonic crystal fiber comprises a Holey fiber.

10. The method of claim 8, wherein said photonic crystal fiber comprises an Omniguide fiber.

11. The method of claim 7, wherein said core comprises said one or more nonlinear materials in a defined region.

12. The method of claim 7, wherein said cladding structure comprises said one or more materials.

13. A gap-soliton structure comprising:

a cladding structure having alternating layers of different index values; and

a core region that is interposed between said alternating layers of index values, wherein either said core or said cladding structure is indicative to enhancing said gap-soliton bistability of said structure.

14. The gap-soliton structure of claim 13, wherein said said cladding structure and core region for a photonic crystal fiber.

15. The gap-soliton structure of claim 14, wherein said photonic crystal fiber comprises a Holey fiber.

16. The gap-soliton structure of claim 14, wherein said photonic crystal fiber comprises an Omniguide fiber.

17. The gap-soliton structure of claim 13, wherein said core comprises said one or more nonlinear materials in a defined region.

18. The gap-soliton structure of claim 13, wherein said cladding structure comprises said one or more materials.

19. A method of forming a gap-soliton structure comprising:

forming a cladding structure having alternating layers of different index values; and

forming a core region that is interposed between said alternating layers of index values so that either said core or said cladding structure is indicative to enhancing said gap-soliton bistability of said structure.

20. The method of claim 19, wherein said said cladding structure and core region for a photonic crystal fiber.

21. The method of claim 20, wherein said photonic crystal fiber comprises a Holey fiber.

22. The method of claim 20, wherein said photonic crystal fiber comprises an Omniguide fiber.

1 23. The method of claim 19, wherein said core comprises said one or more nonlinear
2 materials in a defined region.

1 24. The method of claim 19, wherein said cladding structure comprises said one or more
2 materials.

1 25. The gap-soliton structure of claim 1, wherein said core performs single mode guiding
2 of light.

1 26. The gap-soliton structure of claim 1, wherein said core comprises a modified core
2 portion in which propagation is not allowed.

1 27. The gap-soliton structure of claim 1, wherein said cladding structure comprises a
2 modified cladding portion in which propagation is not allowed.

1 28. The gap-soliton structure of claim 26, wherein said modified core portion comprises
2 said one or more nonlinear materials.

1 29. The gap-soliton structure of claim 27, wherein said modified cladding portion
2 comprises said one or more nonlinear materials.

1 30. The method of claim 7, wherein said core performs single mode guiding of light.

1 31. The method of claim 7, wherein said core comprises a modified core portion in
2 which propagation is not allowed.

1 32. The method of claim 7, wherein said cladding structure comprises a modified
2 cladding portion in which propagation is not allowed.

33. The method of claim 31, wherein said modified core portion comprises said one or more nonlinear materials.

34. The method of claim 32, wherein said modified cladding portion comprises said one or more nonlinear materials.

35. The gap-soliton structure of claim 13, wherein said core performs single mode guiding of light.

36. The gap-soliton structure of claim 13, wherein said core comprises a modified core portion in which propagation is not allowed.

37. The gap-soliton structure of claim 13, wherein said cladding structure comprises a modified cladding portion in which propagation is not allowed.

38. The gap-soliton structure of claim 36, wherein said modified core portion comprises said one or more nonlinear materials.

39. The gap-soliton structure of claim 37, wherein said modified cladding portion comprises said one or more nonlinear materials.

40. The method of claim 19, wherein said core performs single mode guiding of light.

41. The method of claim 19, wherein said core comprises a modified core portion in which propagation is not allowed.

42. The method of claim 19, wherein said cladding structure comprises a modified cladding portion in which propagation is not allowed.

1 43. The method of claim 41, wherein said modified core portion comprises said one or
2 more nonlinear materials.

1 44. The method of claim 42, wherein said modified cladding portion comprises said one
2 or more nonlinear materials.